

Telemental health: a status update

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A rather large body of literature now exists on the use of telemental health services in the diagnosis and management of various psychiatric conditions. This review aims to provide an up-to-date assessment of telemental health, focusing on four main areas: computerized CBT (cCBT), Internet-based CBT (iCBT), virtual reality exposure therapy (VRET), and mobile therapy (mTherapy). Four scientific databases were searched and, where possible, larger, better-designed meta-analyses and controlled trials were highlighted. Taken together, published studies support an expanded role for telepsychiatry tools, with advantages that include increased care access, enhanced efficiency, reduced stigma associated with visiting mental health clinics, and the ability to bypass diagnosis-specific obstacles to treatment, such as when social anxiety prevents a patient from leaving the house. Of technology-mediated therapies, cCBT and iCBT possess the most efficacy evidence, with VRET and mTherapy representing promising but less researched options that have grown in parallel with virtual reality and mobile technology advances. Nonetheless, telepsychiatry remains challenging because of the need for specific computer skills, the difficulty in providing patients with a deep understanding or support, concerns about the “therapeutic alliance”, privacy fears, and the well documented problem of patient attrition. Future studies should further test the efficacy, advantages and limitations of technology-enabled CBT, as well as explore the online delivery of other psychotherapeutic and psychopharmacological modalities.

Key words: Telemental health, telepsychiatry, Internet-mediated cognitive behavioral therapy, virtual reality exposure therapy, mobile therapy, mobile apps, short message service, depression, social phobia, specific phobias, post-traumatic stress disorder, obsessive-compulsive disorder

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The delivery of mental health services via telecommunication systems is having a remarkable expansion. For example, nearly 6% of all mobile health applications are now devoted to mental health (1).

Telemental health uses computer programs, Internet programs, teleconferencing, and smartphone applications for the remote delivery of mental health services, including diagnosis, assessment, symptom tracking, and treatment.

The aim of this paper is to review the current state of telemental health, focusing on its four main areas: computerized CBT (cCBT), Internet-mediated CBT (iCBT), virtual reality exposure therapy (VRET), and mobile therapy (mTherapy).

Articles were identified using PubMed, PsycINFO, ScienceDirect, and Wiley Online Library. The search was conducted using the terms “telepsychiatry”, “telemental health”, “computerized cognitive behavioral therapy”, “assisted computerized psychotherapy”, “unassisted computerized psychotherapy”, “Internet therapy”, “mobile cognitive behavioral therapy”, “mobile therapy”, “virtual reality exposure therapy”, “virtual reality therapy”, and “remote cognitive behavioral therapy”. Google Scholar and Metacrawler search engines were also used to help identify unpublished material and book chapters.

The studies included in the review were limited to those published in English, with no restrictions placed on the country or year of publication. To the extent allowed by the literature, well-designed meta-analyses and larger, controlled trials with clearly defined outcome measures and inclusion and exclusion criteria were highlighted.

COMPUTERIZED AND INTERNET-MEDIATED CBT

Several forms of technology-enabled psychotherapy now exist. They differ in important ways with respect to the tech-

nology platform, level of clinician involvement, and type of therapy.

cCBT refers to the use of software programs to deliver standardized, automated psychotherapy via personal computers, CD-ROMs and desktop programs, or through interactive voice response (IVR) telephone systems. It dates back to the 1980s (2) and has been the first technology-enabled therapy delivery system to be formally studied.

Since conventional CBT is often a manualized, standardized treatment, it was thought to lend itself well to the use of technology in a way that minimized therapist involvement beyond the initial steps of program design (3). Thus, exploration of computer programs that would “conduct” CBT with patients began relatively early, before the Internet became a widespread phenomenon and the cornerstone of telemedicine and telemental health today (4).

Via specifically designed software programs, cCBT allows individuals to self-diagnose, personalize treatment goals, and employ standardized therapy tools to achieve symptom control and relapse prevention. It involves variable levels of therapist intervention: standalone or unassisted cCBT generally refers to the independent use of a standardized, software-based treatment program that almost completely bypasses the therapist (5), whereas guided or assisted cCBT typically incorporates minimal therapist involvement (6-8).

Beyond cCBT, the last decade has witnessed the remarkable growth of Internet-mediated psychotherapy. Several studies have explored the delivery of various psychotherapeutic approaches via the Internet, including interpersonal psychotherapy and online psychoeducation. However, most of the existing psychotherapy literature investigating the use of the Internet has focused on the delivery of CBT, an approach that has at times been called iCBT (e.g., 2,9).

Like cCBT, iCBT includes unassisted programs (5) as well as programs that incorporate minimal therapist involvement, usually via email or text message exchanges (assisted iCBT) (10). A third form of iCBT is “real-time” iCBT, which consists of live online conversations with “full” therapist involvement, and it may or may not include a video conferencing component (11,12).

Efficacy

Several meta-analyses have examined the efficacy of technology-enabled CBT. A meta-analysis of 14 randomized controlled trials (RCTs) and 2,976 subjects compared both assisted and unassisted cCBT to either waitlist or traditional CBT in the treatment of adult depression (13). cCBT showed a moderate post-treatment effect size on depressive symptoms when compared to the waitlist group, with equivalent outcomes compared to traditional CBT. However, traditional CBT performed better than cCBT in functional improvement and symptom reduction at the long-term follow-up points and was associated with lower dropout rates.

A large iCBT meta-analysis included 108 trials, of which 104 reported on clinical efficacy (N=9,410) and eight on cost-effectiveness (N=2,964) (2). Studies varied considerably in methodologies, outcome measures and conditions treated, and compared either unassisted iCBT to assisted iCBT or one of those interventions to a waitlist control or face-to-face therapy. Among the studies, 12 RCTs compared iCBT to traditional CBT in the treatment of depressive symptoms, social phobia, panic disorder, specific phobia (arachnophobia), sexual dysfunction and body dissatisfaction. Pooled results from the RCTs demonstrated similar efficacy on outcome measures as determined by effect size.

The literature on real-time iCBT with or without videoconferencing is more limited. In an RCT of adult subjects with major depressive disorder, 197 participants were assigned to ten sessions over 16 weeks of real-time iCBT with a live therapist and without videoconferencing, and 148 participants to an eight-month waitlist. Subjects in both groups continued to receive “usual care” by their general practitioners. At the four-month follow-up, 38% of subjects in the real-time iCBT vs. 24% in the control group responded, based on the Beck Depression Inventory (11).

Also, a study of 26 subjects (mean age: 30) with mood or anxiety disorders randomly assigned participants to either real-time iCBT with videoconferencing or traditional CBT. Participants received 12 weekly one-hour sessions and a follow-up session six weeks post-treatment. Real-time iCBT with videoconferencing was associated with a statistically significant reduction in symptoms of depression ($p<0.001$), anxiety ($p<0.001$) and “stress” ($p<0.001$), and had a similar efficacy to traditional CBT (3).

A more recent RCT investigated the efficacy of exposure and response prevention based CBT in the treatment of obsessive-compulsive disorder (OCD) in 30 subjects random-

ly assigned to 12 weeks of real-time iCBT with videoconferencing (N=10), self-help book-based exposure and response prevention (N=10), or a waitlist group (N=10). Post-treatment assessment demonstrated the superiority of real-time iCBT with videoconferencing: six participants (60%) receiving this treatment option achieved “clinically significant” improvement as assessed by the Yale-Brown Obsessive-Compulsive Scale; one participant (10%) demonstrated “reliable change” in response to self-help; and all participants in the waitlist group demonstrated “no change” (14).

Finally, group technology-enabled therapy has also received some research attention. A study compared the efficacy of real-time group iCBT with videoconferencing to face-to-face group CBT. It asked 18 subjects with depression or anxiety to select between the two interventions. Eight chose real-time iCBT with videoconferencing and appeared along the perimeter of the screen with the therapist in the center and could interact with one another and the therapist in real time; 10 chose traditional CBT. Subjects in both groups received 13 weekly one-hour group sessions. No significant difference was seen in efficacy, with approximately 60% in each group responding (15).

Special populations

Technology-enabled therapies have been studied for their potential use in special populations, including children and adolescents (16,17) and medically ill psychiatric patients (18).

A recent meta-analysis examined the efficacy of one unassisted iCBT program (BRAVE-ONLINE) and three assisted iCBT programs (BRAVE, COPE-A-LOT and “Think, Feel, Do”) in the treatment of childhood anxiety disorders. Data from seven studies (five controlled trials, one case study and one cohort study) and 240 subjects aged 7 to 16 collectively demonstrated the efficacy of unassisted and assisted iCBT, with results comparable to those of traditional CBT (19).

Similarly, a study in 31 child and adolescent subjects with OCD (mean age: 11) randomly assigned participants to family real-time iCBT with a live therapist and videoconferencing or to a waitlist control. Participants received 14 family-based sessions and were assessed at one week and three months post-treatment. Subjects assigned to the waitlist group were assessed at four weeks post-randomization. Results demonstrated the superiority of real-time iCBT with videoconferencing: 81% response and 56% remission rates were seen among participants receiving iCBT, compared to 13% response and remission rates in the waitlist group (12).

Telemental health interventions in patients who have medical comorbidities have received some research attention as well. An RCT of 56 subjects with fibromyalgia and mild to moderate depression or anxiety randomly assigned participants to either six weeks of minimally assisted iCBT or continued unchanged pharmacological treatment. Subjects were assessed at one, six and 12 weeks post-intervention. At all assessment points, iCBT was associated with a significant

reduction in both the Fibromyalgia Impact Questionnaire scores and tender point sensitivity as assessed via physical examination (18).

Prevention

Several studies have explored the role of technology-enabled therapies in the prevention of psychiatric illness. One RCT tested the efficacy of unassisted iCBT in preventing depression in 163 university students who were randomly assigned to either five weeks of unassisted iCBT or a waitlist control. Subjects who received unassisted iCBT had significantly less depressive symptoms and improved literacy about depression at study end. The dropout rate, however, was significantly higher within the unassisted iCBT group compared to the control group (46.9 vs. 28.0%) (5).

In a relapse prevention study of iCBT in partially remitted depression, 303 subjects were randomly assigned to one of three interventions: unassisted iCBT, traditional therapy, or unassisted iCBT combined with traditional therapy (6). Individuals assigned to unassisted iCBT or unassisted iCBT combined with traditional therapy received nine online sessions. No statistically significant difference was seen in response and remission rates between unassisted iCBT and either traditional therapy or unassisted iCBT combined with traditional therapy. However, data at the 12-month follow-up demonstrated that traditional therapy was associated with a lower relapse rate compared to unassisted iCBT (20.7 vs. 31.3%).

Another study tested assisted iCBT in the prevention of relapse in partially remitted depression by randomly assigning 84 subjects to ten weeks of either 16 sessions of assisted iCBT or a waitlist control (7). Assessment at the 24-month follow-up demonstrated a significantly lower relapse rate in the assisted iCBT compared to the control group (13.7 vs. 60.9%).

Finally, a study examined the impact of minimally guided iCBT on the relapse of severe health anxiety (hypochondriasis) at six and 12 months after the conclusion of an RCT. Minimally guided iCBT yielded significantly better symptom control as well as increased cost-effectiveness compared to the waitlist control (20).

VIRTUAL REALITY EXPOSURE THERAPY

VRET refers to the use of virtual reality to conduct exposure therapy by mimicking real-life situations. The earliest experimental attempts on the use of virtual reality exposure as a treatment modality date back to 1992 (21), but it was only recently that the digital revolution brought about head-mounted displays, computer automated virtual environments, motion sensors and other sophisticated tools, making VRET environments more realistic, immersive and interactive. That, combined with the decreasing cost of the

technology involved, has made VRET a potentially viable alternative to *in vivo* exposure therapy, and one that seems on the way to broader adoption (22).

VRET is generally conducted over six to 12 sessions, each lasting between 45 and 60 min (23). It has received less research attention than cCBT or iCBT, but efficacy data suggest its potential role in the treatment of several psychiatric conditions, including phobias, post-traumatic stress disorder (PTSD), OCD and substance use disorders.

Efficacy

Social anxiety disorder (social phobia)

Multiple studies provide evidence in support of VRET in the treatment of social anxiety disorder and public speaking anxiety. In a study of 41 subjects with social anxiety disorder, subjects participated in four sessions of cognitive restructuring, followed by four virtual sessions that targeted particular feared social settings (e.g., conference room, classroom, large auditorium). The study provided evidence that environments that better mimicked the feared scenario outperformed those that did not (24). A similar outcome was observed in a controlled trial that compared VRET to conventional CBT in the treatment of public speaking anxiety in a total of eight subjects. Participants were asked to deliver a speech before a real-life audience of five to nine individuals before and after completing four VRET sessions. All participants reported subjective improvement in public speaking anxiety immediately following, and several months after, the intervention (25).

Another study (N=88) compared the efficacy of 12 sessions of conventional CBT, 12 sessions of VRET, and a waitlist control in social anxiety disorder. VRET and conventional CBT proved equally superior to the waitlist group, with sustained improvement at one-year follow-up (26).

Specific phobias

Clinical trials of VRET in the treatment of specific phobias have also provided promising evidence. Several studies have explored the treatment of agoraphobia using VRET and have demonstrated superiority over a waitlist control (e.g., 27,28). A larger, more recent study assessed the efficacy of VRET in 80 subjects with long-standing (five years or more) agoraphobia. Subjects were randomly assigned to one of three groups: CBT with drug therapy ("CBT group"), N=30; CBT with drug therapy and VRET ("VRET group"), N=30; and drug therapy alone ("drug group"), N=20. Individuals in both the "CBT group" and the "VRET group" received five sessions of psychoeducation and cognitive restructuring, followed by six sessions of CBT or CBT and VRET. Both interventions were associated with clinical improvement, but VRET was associated with better adherence (29).

Claustrophobia has also received attention as a possible target for VRET. One study tested VRET in four subjects with claustrophobia, exposing them to eight virtual environments of increasing claustrophobic severity. Results demonstrated the efficacy of VRET both immediately after, and at the three-month follow-up (30). Another study in six subjects with claustrophobia suggested benefit from VRET, with the benefit shown to extend into real-life situations (31).

At least two controlled trials have demonstrated improved clinical outcomes for VRET vs. waitlist and equal benefit for VRET and conventional exposure therapy in the treatment of aviophobia (21,32,33). Finally, small studies have demonstrated improvement from VRET in the treatment of acrophobia (34,35).

Post-traumatic stress disorder

The first use of virtual reality in PTSD treatment involved a Vietnam War veteran (36), with a subsequent study in ten Vietnam War veterans demonstrating statistically significant reductions in both anxiety and avoidance levels that persisted at the three- and six-month follow-up points (37).

Other studies have suggested the efficacy of VRET in the treatment of PTSD resulting from non-war traumas. For example, a controlled study in subjects with PTSD stemming from the September 11, 2001 terrorist attacks compared VRET to a waitlist group. Of the 13 subjects who received VRET, five were resistant to previous treatments, and, of the ten receiving VRET who completed the study, nine experienced statistically significant improvement (38). Similarly, a study in ten subjects with PTSD resulting from abuse, crime assault or car accident randomly assigned participants to either conventional CBT or VRET. Both treatment modalities resulted in significant improvement in core PTSD symptoms (39). Finally, one article reviewed the possible role of VRET in the treatment of post-fall PTSD-like symptoms in elderly patients, providing evidence in favor of VRET and noting its ease of use in that patient population when compared to *in vivo* exposure (40).

Obsessive-compulsive disorder

Data on using VRET in the treatment of OCD are limited, in part because of the difficulty and cost of building programs that simulate the wide variability in OCD triggers among patients. However, a study comparing 30 subjects with OCD to 27 matched controls yielded an increased level of compulsive checking among subjects with OCD in response to virtual triggers compared to the control group, which suggested a role for VRET in OCD treatment and led to a subsequent, uncontrolled study in 24 subjects with arranging compulsions. Results from that study showed a decrease in OCD-related anxiety in response to VRET (41).

Substance use disorders

Treatment of drug dependence often involves strengthening the ability to resist using drugs when faced with triggers that provoke craving. Conventional CBT therapists usually rely on photographs and films to elicit craving, but have difficulty mimicking the behavior's typical setting. The need to better simulate real-life situations has led to the investigation of virtual reality as a more immersive environment in which to conduct therapy.

An early study investigating VRET in the treatment of five heroin-dependent subjects incorporated virtual cues that typically elicit craving. Both subjective (e.g., anxiety) and objective (e.g., autonomic activation) measures suggested the ability of virtual exposure to trigger real-life responses (42). More recently, a sample of 47 chronic smokers demonstrated hyperarousal when exposed to virtual smoking paraphernalia (43). To our knowledge, no study has compared VRET to conventional CBT in the treatment of substance use.

Other conditions

VRET has been preliminarily explored in the treatment of other conditions as well. For example, a study in 34 female subjects with eating disorders compared the efficacy of conventional CBT alone to CBT with VRET. Both groups demonstrated statistically significant improvement in body image, but participants receiving CBT with VRET showed greater improvement at the one-year follow-up point (44).

Further, and despite fear that virtual simulations might exacerbate symptoms in conditions already characterized by impaired reality testing, studies are beginning to assess VRET in psychotic individuals, with one schizophrenia trial (N=91) suggesting improved assertiveness and conversational abilities with VRET, as well as higher interest by subjects in virtual environment platforms than conventional treatment settings (45).

MOBILE THERAPY

mTherapy refers to the use of mobile phone devices, smartphones and mobile applications or "apps" in the delivery of mental health services. Its popularity has grown rapidly, as indicated by the title, "*Smartphone apps become surrogate therapists*", of a 2012 lay press article (46). Indeed, survey data suggest that mTherapy interventions may be favored over other telemental health tools by health care consumers (47).

Currently, over 3,000 mental health apps exist in Apple's App Store and Google's Google Play (48). They offer help with diagnosing (49), self-monitoring (1,48), symptom tracking and documentation (50), adherence to traditional therapy (51), and appointment and therapy homework reminders

(48). They can also provide convenient means for interacting with therapists between appointments (52). Although the literature on their efficacy remains scarce, some preliminary outcome data exist covering the more common forms of mTherapy.

Mobile apps

Mobile apps are the main form of mTherapy and include self-monitoring apps (52), apps that enhance self-awareness (53), apps that help with self-regulation (54), and CBT-inspired apps (mCBT) (55). A randomized trial of a self-monitoring app assigned 18 subjects to seven days of monitoring. The study demonstrated superiority over retrospective questioning about depression and stress (52). That was explained by decreased memory bias when gathering data and recording behaviors and thoughts as they occurred in real-life situations.

Another RCT in 118 depressed subjects aged 14 to 24 randomly assigned individuals to the use of mobile self-monitoring apps that tracked mood, stress level, and daily activities (N=68) or to a control group (N=46) where only daily activities were monitored. The use of mobile self-monitoring apps was associated with increased “emotional self-awareness”, decreased depressive symptoms, rapid symptom improvement, and time savings compared to the control group (53).

Preliminary data from RCTs suggest benefit from mobile CBT as well. In one study, male subjects were assigned to one of two interventions: 11 received mobile CBT and 12 were assigned to waitlist. Individuals in the mobile CBT group received three group meetings conducted by a psychologist, in addition to self-reporting between meetings via a mobile CBT app that focused on clarifying personal values, goal setting, relaxation, mindfulness, and acceptance tools. It was hypothesized that between-meeting self-reporting would improve the continuity and impact of the face-to-face intervention. Indeed, mobile CBT was associated with a greater reduction in depressive symptoms than the control group at post-treatment, in addition to an improvement in reported overall health and working ability (55).

Another RCT in 35 subjects (mean age: 41 years) with major depressive disorder randomly assigned 15 to mobile CBT and 20 to cCBT. The “Get Happy” mobile app was used and consisted of six lessons to be completed over eight weeks. Both mobile CBT and cCBT were associated with a statistically significant reduction in depressive symptoms post-treatment and at the three-month follow-up (56).

A more recent study compared the efficacy of apps for mobile CBT and for mobile interpersonal therapy in treating social anxiety disorder. Fifty-two subjects were randomly assigned to receive either mobile CBT (N=27) or mobile interpersonal therapy (N=25). Mobile CBT performed better than mobile interpersonal therapy as measured by the Liebowitz Social Anxiety Scale, both post-treatment and

at the three-month follow-up (between group Cohen’s $d=0.64$) (57).

Text messaging or short message service

Text messaging, or short message service (SMS), has been used as an mTherapy intervention that allows for the immediate delivery of interventional messages and reminders of health goals, appointments and therapy homework (58). Preliminary studies have investigated it in the treatment of conditions such as major depression and psychotic disorders.

A study in 54 subjects with major depression and comorbid alcohol use disorder randomly assigned participants to either receiving twice-daily supportive text messages (N=26), or to a waitlist group where participants received “thank you” text messages once every 14 days (N=28). Subjects were followed for up to three months. Results, as assessed by the Beck Depression Inventory, showed a statistically significant difference in favor of text messaging when compared to the waitlist control (59).

Phone calls

Voice phone calls are an older form of mTherapy and have been used in the treatment of various psychiatric conditions, including anxiety disorders and depression. An RCT assessed phone-based psychotherapy in the reduction of suicidal ideation and self-harm by randomly assigning 68 subjects to either brief phone treatment alongside traditional face-to-face psychotherapy (N=34) or only face-to-face psychotherapy (N=34). Voice calls focused on mood assessment, provision of reassurance, problem-solving, and medication training. Assessment at six and 12 months following therapy initiation revealed that subjects also receiving phone psychotherapy had significantly less suicidal ideation and other depressive symptoms (60).

DISCUSSION

To a large degree, the potential advantages of telemental health mirror those of telemedicine and include improved access to care, especially for patients who live in areas that are under-served by mental health professionals, who have physical limitations that limit their ability to obtain traditional care, or whose work or other responsibilities prevent them from commuting to a regular clinic. In addition, the reduced need for office-related infrastructure may help contain costs and improve efficiency, helping make health care services more affordable overall. Advantages that are more specific to telemental health include reducing the stigma attached to visiting mental health facilities, as well as the ability to bypass diagnosis-specific obstacles to treatment (e.g., social anxiety-

or OCD-related fear of leaving the house or visiting a treatment setting).

Still, telemental health in its various manifestations remains somewhat controversial, in part because of ongoing concerns among patients and professionals about how technology platforms might impact the “therapeutic alliance” (61). Other problems include the lack of sufficient support, the inability to provide users with a deep understanding of their conditions, and the need for specific computer skills (62). Moreover, while CBT (and, by extension, exposure and response prevention) has been investigated to some degree, little data are available on other common forms of psychotherapy, and virtually no data exist on technology-assisted psychopharmacological care.

Of all technology-mediated therapies, cCBT and iCBT have been researched the most. Compared to cCBT, which was once limited to CD-ROMs and installable programs that required individuals to independently complete activities in the absence of therapist guidance, iCBT appears to be an advance in that it offers access to a broader variety of CBT programs, while also providing the opportunity for varying levels of therapist guidance. Research studies point to many successes for cCBT and iCBT across several psychiatric disorders and support a role for these interventions in modern psychotherapy delivery. Still, a major limitation of cCBT and, perhaps to a lesser degree, iCBT appears to be patient attrition (16).

VRET is a younger technology-enabled therapy that may possess advantages over traditional forms, especially when it comes to recreating challenging exposure situations, such as airplanes (for aviophobia) or bar settings (for alcohol-related disorder). Compared to traditional CBT, VRET may have the added advantage of additional control over the exposure exercise and a sense of increased safety when confronting phobic stimuli (63). This therapy, however, remains inadequately tested and not widely available, in part due to the need for infrastructure investment and training (64). With the increased availability and affordability of simulation technology, as evidenced by the current availability of highly sophisticated and immersive video games, VRET may become a more reasonable adjunct to, or possibly replacement for, conventional exposure therapy in certain disorders.

The most recent chapter in the digital revolution has been the dramatic rise of mobile technologies, including smartphones and associated apps. A parallel move has occurred within telemental health, where mental health apps have seen remarkable growth. Among other goals, they purport to help with self-monitoring and the very targeted delivery of therapeutic interventions. Compared to other forms of telemental health, a main advantage of mTherapy is its portability, which can make available data on behaviors, thoughts and coping strategies in real time, and help design highly specific, contextualized interventions. High attrition rates and respondent fatigue, however, seem to be serious limitations with mTherapy as well (52), and further evidence about efficacy is needed.

CONCLUSIONS

It has been estimated that up to 50% of all health care services will be conducted electronically by 2020 (65). Telemental health has been an integral part of the telemedicine movement and, given the “hands off” nature of many mental health services and the reduced need for treatment tools such as physical exams, lab tests and radioimaging, it may be poised to grow even faster than other medical fields.

So far, however, the rise of telemental health has generally outpaced scientific research, which limits the ability to make strong recommendations, especially when the substitution of online platforms for conventional care is being considered. Randomized clinical trials of adequate size and representation are clearly needed in order to establish the efficacy, safety and treatment adherence of available interventions, as well as to test some woefully understudied ones, such as Internet-enabled psychopharmacological care.

In addition, concerns about data and interaction confidentiality as well as compliance with health information regulations, such as the Health Insurance Portability and Accountability Act in the U.S., remain an obstacle to adoption by patients and providers alike and should be prioritized. Finally, insurer reimbursement needs to be assessed and advocated for in the case of interventions that have been shown to be effective and secure, especially if conventional alternatives are inaccessible, too expensive or insufficient on their own.

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